NEVADA DEPARTMENT OF WILDLIFE
STATEWIDE FISHERIES MANAGEMENT

FEDERAL AID JOB PROGRESS REPORT
F-20-54
2018

Lahontan Reservoir
WESTERN REGION

NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION
ANNUAL PROJECT REPORT

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State: *Nevada*
Project Title: *Statewide Fisheries Program*
Job Title: *Lahontan Reservoir*
Period Covered: *January 1, 2018 through December 31, 2018*

SUMMARY

It was a below average water year in the Carson Basin and snow-water equivalent was 86% of average compared to the 208% drought buster in 2017. The water elevation in Lahontan Reservoir rose rapidly during spring and remained high for most of the year. There were no emergency water releases down the lower Carson River this year, and the irrigation season was normal. Regulating reservoirs in the Lahontan valley remained full throughout most of the year.

A boat inspection program began, with two decontamination stations that have been operating throughout the summer of 2018 were located at the North Shore Marina and at the State Parks entrance near the Silver Springs boat launch.

No commercial fishing for Sacramento blackfish occurred during 2018 due to high water. Fish become dispersed and inundated vegetation in the littoral zone interferes with seining operations. Gill netting surveys in 2018 were successful in documenting carp, walleye, crappie, wipers, channel catfish, and white bass, with white bass dominating. During the drought just prior to 2018, annual surveys found few fish resulting from low water levels. Electroshocking was also successful in documenting white bass, smallmouth bass, wiper, walleye, and trout. No adult Sacramento blackfish were captured; therefore, there was no testing for mercury.

In 2018, walleye fry were stocked to augment the population and wipers were stocked during April and October. Some wipers were tagged during 2016 and 2017 as part of a study aimed at evaluating their status after stocking and the potential of the reservoir to support a trophy wiper fishery. A large cohort of white bass was observed during 2018, which accounted for much of the angling success throughout the summer and fall. Catch rates were very high with some anglers catching more than 100 fish in a day.

BACKGROUND

Lahontan Reservoir was created in 1915 by the construction of Lahontan Dam, which impounded water from the Carson River and Truckee River (via the Truckee Canal) for farmland irrigation, hydropower, flood control, domestic water, and recreation. This was part of the Newlands Reclamation Project created by the Bureau of Reclamation.

Maximum surface area of the reservoir is 14,600 acres with a maximum storage of 319,000 acre-ft (AF). At maximum pool, the deepest point reaches 85 ft. The reservoir is eutrophic, which creates a very productive fishery. An estimated 7,500 tons of mercury were discharged into the Carson River drainage resulting from Comstock mining practices and, consequently, methylmercury concentrations in many fishes are above the safe state and federal consumption levels. Division of Public and Behavioral Health, Nevada Division of Environmental Protection, and NDOW advise "No consumption of fish from Lahontan Reservoir, the Carson River below Dayton, and all waters in Lahontan Valley."

Despite the health advisory, Lahontan Reservoir continues to provide excellent recreation through angling. The prominent sport fishes include white bass, wipers (white bass x striped bass hybrid), largemouth bass, smallmouth bass, channel and white catfish, white and black crappie, yellow perch, and walleye. Fingerling wiper and larval walleye are generally stocked annually.

In 1981, NDOW began issuing a commercial fishing permit in an attempt to reduce the Sacramento blackfish population in Lahontan Reservoir. Prior to commercial fishing, substantial blackfish mortality was documented in the reservoir at the Carson River inlet during spring when blackfish spawned. During the first four years of commercial operation, the average annual harvest of blackfish was nearly 350,000 lbs. In 2005, a harvest moratorium was instituted when catch rates declined, which was viewed as a possible indication of a population crash. The blackfish harvest moratorium was withdrawn in 2008 and an annual commercial collection permit was issued to the previous permittee.

OBJECTIVES AND APPROACHES

Objective: General Fisheries Management

Approaches:

- Conduct a general fisheries assessment through opportunistic angler contacts and mail-in angler questionnaire data.
- Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) at least three times.
- Document dissolved oxygen and temperature when sampling quagga mussel veligers.
- Monitor for the presence of adult quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times.
- Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times.
- Stock 1 million walleye fry and 5,000 juvenile wipers.
- Monitor sport fish populations through electroshocking four established transects in late spring/early summer.
- Concurrent to electroshocking survey, collect white bass to augment the population in Washoe Lake that was lost to drought.

- Monitor sport fish populations through gill netting four net-nights in late spring/early summer.
- Coordinate with the commercial fishing operation to collect 20 Sacramento blackfish for mercury level analysis by EPA.
- Increase habitat complexity and provide juvenile habitat cover with additional artificial habitat structures.

Objectives: Monitor Wiper Population Demographics

Approaches:

- Tag 1,000 hatchery raised wipers with color specific Floy tags.

PROCEDURES

General Fisheries Management

Conduct a general fisheries assessment through opportunistic angler contacts and mail-in angler questionnaire data. Information obtained from anglers included time fished; number, size and species of fish caught; location where fished; place of residence; and type of bait or lure used. Mail-in angler questionnaire data was derived from a survey mailed to 30,000 anglers purchasing a Nevada fishing license in 2017.

Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) at least three times per year. Lake level data was received throughout the year from USGS gauge number 10312100 near the dam. Clarity was measured directly using a Secchi disk and measurements were taken on April 23, 2018, and October 2, 2018 near the dam.

Document dissolved oxygen and temperature when conducting veliger sampling. Vertical profiles of temperature and dissolved oxygen were measured on April 23, 2018, and October 2, 2018 near the dam.

Monitor for the presence of quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year. Tactile surveys were conducted through inspection of the boat dock at Churchill Beach boat launch, Silver Springs boat launch, and the dam. Buoys and rock structures near the dam and boat launches were inspected for adult quagga mussels by snorkeling on three occasions during April, June, and July.

Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year. Plankton tows were conducted April 23, 2018, and October 2, 2018

Stock one million walleye fry and 5,000 juvenile wipers. On May 1, 1-million walleye fry were received from Gavin's Point National Fish Hatchery in South Dakota. Fry mortality was estimated from each box, which varied between 0 to 30%.

Approximately 281,000 were stocked near the North Shore Marina in Churchill County and approximately 500,000 were stocked between Beach 8 and Beach 10 in Lyon County to augment natural reproduction of the walleye population. On April 25, 2018, 3,000 fingerling wipers were received from Colorado Catch Hatchery and stocked at North Shore Marina boat launch. An additional 2,250 were stocked on October 18, 2018.

Monitor sport fish populations through electroshocking four established transects in late spring/early summer. Electroshocking surveys were conducted on May 17, 2018 and were successful in documenting wiper, white bass, walleye, yellow perch, smallmouth bass, Sacramento blackfish, rainbow trout, brown trout, and carp. Electroshocker settings were adjusted several times due to changing water chemistry and fish stress observed. Electroshocking lasted for 94 min using an 18-foot Smith-Root Heavy Duty Series Electrofishing Boat with 9.0 GPP Electrofisher.

Concurrent to electroshocking survey, collect white bass to augment the population in Washoe Lake, which was lost due to drought. On May 17, 2018, 11 white bass were captured during electroshocking from the lower basin of the reservoir and stocked into Washoe Lake. Additional effort through 3 days of hook-and-line sampling caught 550 white bass that were stocked into Washoe Lake during July and August.

Monitor sport fish populations through gill netting four net nights in late spring/early summer. Four gill nets were set in Catfish Cut, L-Cove, Crappie Cove, and the island near the dam on July 2. Sites were chosen based on public safety, angler creel information, commercial harvester data, historical locations, and reservoir level. Nets were set perpendicular to shore and anchored with three-pound weights. Nets were 120 ft long, six feet deep, and mesh sizes ranged from 0.5 to 2.5 in, which increased by 0.5 in increments every 20 ft. Each net was allowed to fish over a 24-hour period.

Coordinate with the commercial fishing operation to collect 20 Sacramento blackfish for mercury level analysis by EPA. No commercial fishing operations were conducted during 2018.

Increase habitat complexity and provide additional juvenile habitat cover with additional habitat structures. Structures purchased from Mossback Fish Habitat were made of “nontoxic, scuffed PVC trunks with composite limbs to simulate trees or root structures as found in a natural environment.” Three different types of structures were utilized, Safe Havens (Figure 1), Root Wad 3 Posts, and Trophy Tree Kits. Product dimensions and specifications are presented in Table 1.

Habitat structures were constructed in Fallon, transported to the reservoir on a flatbed trailer, and then transported in an 18 ft boat to suitable locations determined from bathometric maps and proofed using a fish finder/sonar. All structures were placed in at least 6.0 ft of water and not deeper than 15 ft in order to target areas where fish species were most vulnerable to predation. Habitat locations and depths also function as suitable spawning habitat for warmwater species. It is intended for their offspring to benefit from

the structures as well. Structures were submerged and anchored using 6.0 ft of nylon coated aircraft cable attached to one or two cinder blocks. GPS locations were recorded for each structure for monitoring purposes.

Figure 1. Safe Haven Fish Habitat Structure.

Table 1. Mossback Habitat Specifications.

	Dimensions	Limbs	Number of Anchors
Safe Haven	50" x 50"	24	1
Root Wad 3 Post	25" x 50"	12	1
Trophy Tree Kit	50" x 50"-100"	36	2

Monitor Wiper Population Demographics

Tag 1,000 hatchery raised wipers with color specific Floy tags. Wipers received on October 18, 2018 were exhibiting sign of stress related to long transportation times, they also averaged only 4 inches so it was determined that tagging small fish could cause additional mortality therefore none were tagged. During the 2017 tagging effort, the tags used were model FD-94, 3/4 inch monofilament Long-T manufactured by Floy Tag & MFG, INC, and on June 8, 1,000 wipers were tagged with bright green tags numbered 3001 to 4000. Fork lengths of 56-tagged fish were recorded. No anesthetic was used and tagged fish were given 15 minutes of recovery time in long troughs before being released into the reservoir at Sportsman's Marina (Churchill County). During creel surveys, anglers catching tagged wipers were asked of their location, date, size of fish, number, and color of tag.

FINDINGS

General Fisheries Management

Conduct a general fisheries assessment through opportunistic angler contacts and mail-in angler questionnaire data. Currently, Lahontan Reservoir holds the Nevada record-size walleye (15 lbs 4 oz caught in 1998) and wiper (25 lbs 9 oz caught in 2009). This year, 31 anglers surveyed caught mostly white bass, however, walleye, wiper, smallmouth bass, crappie, and rainbow trout, were also caught. Fish measured included 14 walleye that averaged 12.5 in, 36 white bass that averaged 10.9 in, 5 crappie

that averaged 11 in, and 2 smallmouth bass that both measured 12 in. Total catch rates were 5.91 fish per hour and 17.74 fish per angler-day. Comparatively in 2017, catch rates were 0.91 fish per hour and 1.46 fish per angler-day. The dramatic increase in 2018 can be attributed to a large cohort of white bass in the 7.0 to 10.0 in size class. During white bass collection efforts for stocking in Washoe Lake, it was common to experience a fish bite on every cast for an hour or more. More anglers were seen fishing and were surveyed in 2018 than were found over the past four years and since the water level had been recently restored from the historic low. Catch rates have improved for the second consecutive year, suggesting sportfish may be finally recovering from the long-term effects of drought.

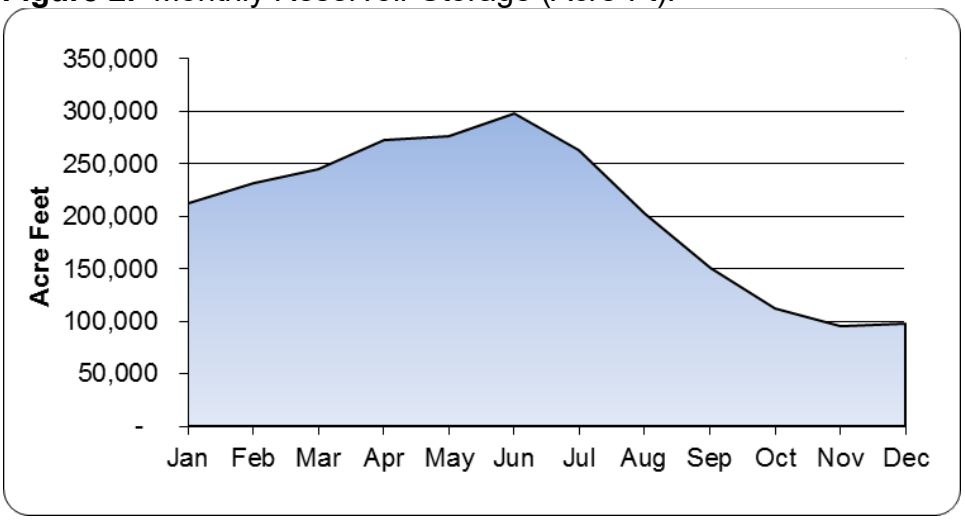
Angler use reported from the Mail-in Angler Questionnaire Survey from 2017 was combined for Lyon and Churchill counties and showed angler use was the highest since 2012 (Table 2). However, angler use and catch rates have not yet rebounded from the four year drought (2013 to 2016).

Table 2. Historical, Mail-in, Angler Questionnaire Survey Summary

	2010	2011	2012	2013	2014	2015	2016	2017	17 YR AVE
No. Anglers	2,495	2,267	2,651	1,304	593	312	1,343	1,627	2,740
No. Days Fished	13,110	10,668	17,208	7,556	1,793	1,620	8,138	5,876	18,365
No. Fish Caught	28,845	19,208	35,494	18,369	5,306	7,197	11,832	12,227	54,466
No. Fish Per Angler Day	2.20	1.80	2.06	2.43	3.58	23.07	8.81	2.08	6.00
Average Storage	93,203	189,783	132,729	68,273	42,844	23,157	53,986	211,375	123,396

Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) at least three times per year. Figure 2 shows Lahontan Reservoir water levels in 2018 as measured by USGS gauge 10312100. Measurements were recorded from the first day of each month.

Figure 2. Monthly Reservoir Storage (Acre-Ft).



The maximum capacity of Lahontan Reservoir is 319,000 acre-ft. In 2018, the lowest storage was recorded on November 12 at 92,080 acre-feet (AF), or 29% of capacity (Table 3). In 2017, lowest storage was reported for January 1 at 70,700 AF, or 22% of capacity. From 2012 through 2016, the reservoir fluctuated dramatically, dropping rapidly in summer, which likely affected spawning, growth, and survival of many fish species. In 2017, the reservoir filled rapidly and remained relatively full all year, with the highest of 305,200 AF recorded on July 13. During 2018, reservoir levels remained high throughout most of the year, only dropping below 100,000 AF near the end of irrigation season in November. Many sport fish species take advantage of inundated terrestrial vegetation during spring and early summer for spawning. This vegetation also provides cover for juvenile fish during summer. When the reservoir level is low and/or drops dramatically, this crucial habitat is not available, which is detrimental to the fishery.

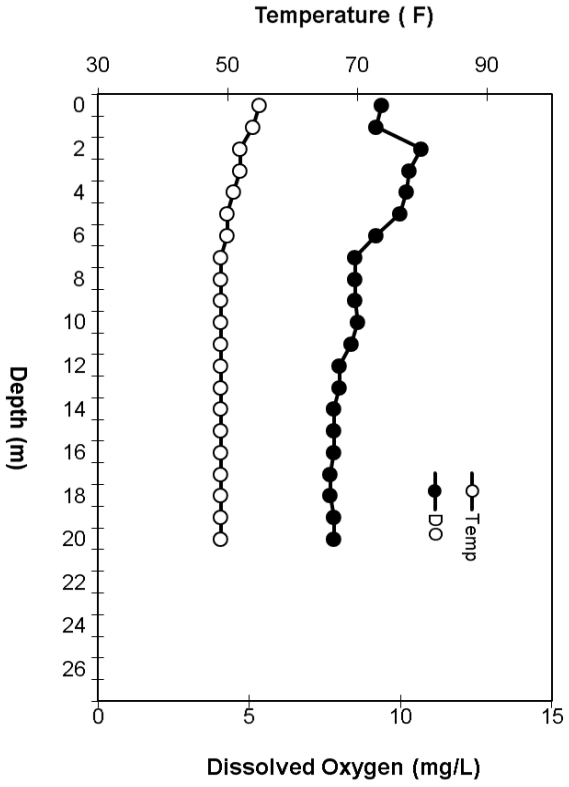
Table 3. Lahontan Reservoir Annual Storage (acre-feet).

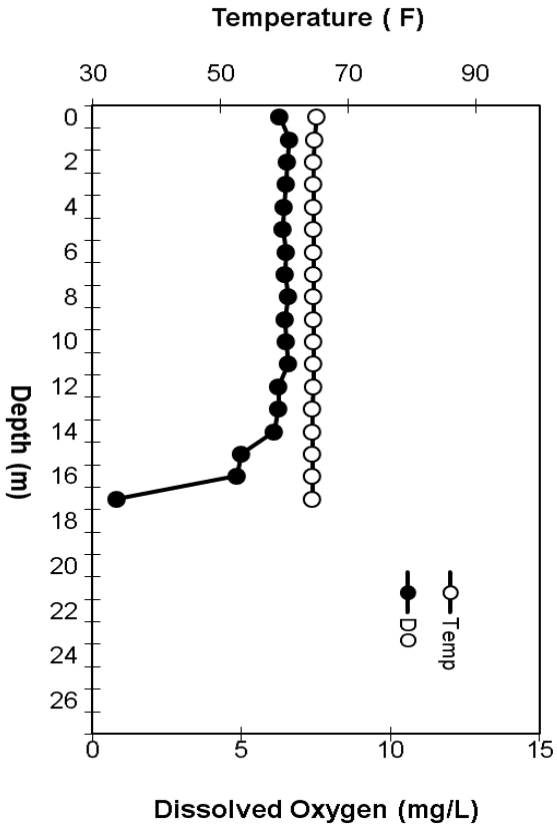
	2011	2012	2013	2014	2015	2016	2017	2018
Jan	95,790	188,600	65,140	40,880	14,870	12,330	70,700	212,400
Feb	117,200	201,600	78,410	54,480	23,790	25,220	160,600	231,400
Mar	132,100	211,400	98,580	74,830	43,230	54,620	248,400	244,900
Apr	176,100	216,800	123,900	95,880	57,990	85,240	249,800	273,000
May	185,500	200,600	119,600	82,810	61,250	96,390	200,100	276,700
Jun	202,500	184,500	115,300	73,420	37,340	121,800	218,900	298,500
Jul	282,900	142,100	89,110	42,950	8,120	110,400	298,600	263,400
Aug	292,200	97,040	51,010	15,580	5,870	65,570	286,300	203,400
Sep	235,100	56,920	17,610	15,920	5,870	24,760	235,500	150,600
Oct	194,900	33,990	7,530	8,910	5,830	4,170	197,800	111,900
Nov	181,500	23,640	18,640	3,930	6,120	12,400	177,000	95,370
Dec	181,600	35,560	34,450	4,540	7,600	34,930	192,800	98,060
Avg.	189,783	132,729	68,273	42,844	23,157	53,986	211,375	204,969

The average monthly reservoir level during 2018 was 204,969 AF or 64% of capacity. During 2017, the annual average was 211,375 AF. Average storage levels above 200,000 AF are considered very high for Lahontan Reservoir and fish populations typically respond quickly. Secchi depths were taken in April and October and showed an average visibility of three feet (0.9 m).

Document dissolved oxygen and temperature when conducting veliger sampling. Dissolved oxygen was measured once in April and again in October (Figure 3). April measurements ranged from 10.7 mg/L (T=55ºF) at 2.0 m below the surface to 7.80 mg/L at 20 m near the bottom (T=49ºF). October measurements ranged from 6.61 mg/L (T=65ºF) at 1.0 m below the surface to 0.85 mg/L (T=64.5ºF) at 17 m near the bottom. Water temperatures were also measured three feet below the surface on at least 10 days throughout the year and ranged from 40ºF in February to 75ºF in September. Temperature and dissolved oxygen levels were suitable for warmwater fish survival throughout most of the water column and throughout the year. No reports of fish kills were received or observed during 2018.

Figure 3. Dissolved Oxygen and Temperature, April 23 (top) and October 2 (bottom).





No thermocline was observed during 2018. The low oxygen levels observed near the bottom of the reservoir during October were likely the result of limited mixing occurring in a low point (i.e., below dam release depth). Good reservoir oxygen levels and relatively low summertime water temperatures were likely the result of adequate Sierra Nevada snowpack and constant reservoir flow through during most of the year.

Monitor for the presence of quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year. Physical inspection of boat docks, buoys, rocky substrates, and boats all were negative for adult quagga and zebra mussels.

Conduct quagga mussel veliger sampling through plankton tows at established transects at least three times per year. Veliger testing in 2018 was found negative by both PCR and microscopy methods.

Stock one million walleye fry and 5,000 juvenile wipers. On May 1, 1,000,000 walleye fry were received from Gavin's Point National Fish Hatchery in South Dakota. Mortality was estimated from each box of fry and it varied between 0 to 30%. Approximately 281,000 were stocked near the North Shore Marina in Churchill County and approximately 500,000 were stocked between Beach 8 and Beach 10 in Lyon County to help augment the natural reproduction of the reservoir's walleye population. On April 25, 2018, 3,000 wipers were received from Colorado Catch Hatchery and stocked at the North Shore Marina boat launch. An additional 2,250 wipers were stocked on October 18, 2018 (Table 4).

Monitor sport fish populations through gill netting four net nights in late spring/early summer. Gill netting data for 2018 is presented in Table 5 along with the gill netting history. From 2005 to 2007, intensive gill netting surveys resulted in an average of 376 net hours; however, in the years, effort has been lessened due to concerns over low population numbers resulting from extended drought.

Only seven wipers have been caught gill netting since 2013, however, through other survey methods (electroshocking and opportunistic angler contacts), it appears the wiper population is recovering from drought ending in 2016. Sacramento blackfish abundance increased to 0.15 in 2012 only to drop to 0.07 in 2013, 0.04 in 2014, and zero in 2016, 2017, and 2018. Numbers of Sacramento blackfish harvested by the commercial operator remained similar during 2014 and 2015, averaging approximately 1,300 lbs per month. However, due to low reservoir levels and concern over a depauperate Sacramento blackfish population, commercial operations were only conducted during November 2016 (500 lbs harvested) and December (795 lbs harvested), with no fishing during 2017 or 2018. During NDOW gill netting, two walleye were caught in 2017, which represented a historical low, however, during 2018 the CPUE increased to 0.13 fish per net hour, the highest since 2012. White and channel catfish were evaluated together and appeared to be the least affected by the effects of drought in the reservoir.

Table 4. Lahontan Reservoir Stocking History.

Year	County	Date	Species	Source	Number	Size (in)
2018	Churchill	5/1/2018	Walleye	Gavins Point NFH	781,000	0.5
	Churchill	4/25/2018	Wiper	Colorado Catch	3,000	5.1
	Churchill	10/18/2018	Wiper	Colorado Catch	2,250	4
2017	Lyon	4/21/2017	Rainbow	Mason Valley Hatchery	5,500	9.7
	Lyon	7/14/2017	Crappie	Willow Creek Res.	452	7
	Churchill	7/14/2017	Crappie	Willow Creek Res.	416	7
	Churchill	10/26/2017	Wiper	Colorado Catch	3,000	7
	Churchill	6/8/2017	Wiper	Colorado Catch	1,625	8
	Churchill	10/26/2017	Walleye	Colorado Catch	200	6
	Churchill	4/26/2017	Walleye	Gavins Point NFH	240,000	0.5
	Lyon	4/26/2017	Walleye	Gavins Point NFH	692,500	0.5
	Lyon	4/25/2017	Rainbow	Mason Valley Hatchery	2,008	9.7
	Churchill	6/12/2017	Rainbow	Mason Valley Hatchery	3,001	9.4
2016	Churchill	4/20/2016	Walleye	Gavins Point NFH	900,000	0.5
		5/26/2016	Wiper	Colorado Catch	2,091	5.5
2015	Churchill	4/23/2015	Walleye	Gavins Point NFH	720,000	0.5
2014	Churchill	N/A			-	
2013	Churchill	4/24/2013	Walleye	Gavins Point NFH	285,000	0.5
2012	Churchill	5/3/2012	Walleye	Gavins Point NFH	438,000	0.5
	Lyon	5/3/2012	Walleye	Gavins Point NFH	500,000	0.5
	Churchill	5/4/2012	Wiper	Colorado Catch	1,000	8

Table 5. Lahontan Reservoir Gill Net Data, 2005 - 2018.

	White bass		Walleye		Crappie		Wiper		Sac. Blackfish		Catfish Combined		Net Hours
	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	Number	CPUE	
2018	75	1.56	6	0.13	7	0.15	5	0.10	0	0.00	7	0.15	48
2017	0	0.00	2	0.02	1	0.01	2	0.02	0	0.00	13	0.14	96
2016	1	0.01	3	0.04	1	0.01	0	0.00	0	0.00	10	0.14	72
2014	4	0.04	9	0.10	3	0.03	0	0.00	4	0.04	41	0.45	92
2013	6	0.06	5	0.05	21	0.21	13	0.13	7	0.07	23	0.23	99
2012	1	0.01	20	0.22	54	0.60	5	0.06	13	0.15	38	0.42	89.5
2011	0	0.00	9	0.09	14	0.14	0	0.00	1	0.01	8	0.08	99
2010	1	0.01	8	0.08	13	0.12	1	0.01	22	0.21	61	0.58	106
2009	0	0	4	0.05	43	0.52	1	0.01	19	0.23	30	0.36	83
2007	266	0.74	105	0.29	78	0.22	262	0.73	28	0.08	160	0.44	360
2006	892	2.19	211	0.52	58	0.14	320	0.78	0	0	55	0.13	408
2005	2	0.01	57	0.16	5	0.01	21	0.06	0	0	19	0.05	360

In Lahontan Reservoir, white bass tend to exhibit large boom and bust cycles. This is represented in Table 5 by a low CPUE of 0.01 during 2005, a high CPUE of 2.19 in 2006, and again a low CPUE of 0.00 in 2009. The bust part of the cycle cycle was again observed in 2017 (CPUE=0.00) and the boom in 2018 (CPUE=1.56) This was likely attributed to good water years when spawning activity and recruitment were highly successful due to an abundance of inundated vegetation, which provides protection for YOY and increases survival. In 2014 and 2015, juvenile white bass dominated beach seining surveys, suggesting successful spawning in spring. Adult CPUE, conversely,

remained low in 2016 and 2017, which seemed to suggest poor recruitment. During 2018, CPUE of white bass rebounded and was the highest recorded since 2006.

Populations of sport fish in Lahontan Reservoir continued to persist naturally despite dramatic fluctuations and extreme low water levels. In 2017, following the four-year drought, the reservoir level increased as the Carson Basin snowpack was approximately 208% of average and the reservoir level remained above average in 2018. All sportfish populations are expected to recover if the reservoir level remains at least average for the next several years.

Monitor sportfish populations through electroshocking four established transects in late spring/early summer. The 2018 electroshocking survey caught 43 fish. Wiper dominated the catch, accounted for 44% of all fish caught, averaged 396 mm (15.6 in), and ranged from 268 mm (10.55 in) to 765 mm (30.12 in). There were two large wipers, a 765 mm fish weighing 17.8 lbs and a 714 mm fish weighing 17.3 lbs. These were most likely stocked in May 2012 when 1,000 8.0 in wipers were purchased from Colorado Catch and suggests it takes a minimum of 6-years to reach this size. In addition to wiper, 11 white bass averaging 294 mm (11.57 in), 6 walleye averaging 392 mm (15.39 in), 4 yellow perch, 1 rainbow trout, 1 brown trout, and 1 Sacramento blackfish were caught.

Concurrent to electroshocking survey, collect white bass to augment the population in Washoe Lake, which was lost due to drought. On May 17, 2018, 11 white bass were electroshocked from the lower bay of Lahontan and then stocked into Washoe Lake. Hook-and-line sampling for 3-days in July and August caught an additional 550 white bass for stocking Washoe Lake. Fish were healthy and no mortalities were observed.

Coordinate with the commercial fishing operation to collect 20 Sacramento blackfish for mercury level analysis by EPA. No commercial fishing occurred during 2018. No Sacramento blackfish of market size were caught during electroshocking, hook and line sampling, or gill netting were caught during 2018 therefore no fish were sent for analysis.

Increase habitat complexity and provide juvenile habitat cover with additional habitat structures. Installation of habitat structures was completed over several months and GPS locations were recorded for each structure placement (Table 6, Figure 4). Boat anglers were observed fishing near these structures and hook-and-line surveys suggests that structures attracted a higher concentration of fish; approximately 100 of the white bass stocked into Washoe Lake were caught near structure locations. It is likely that structures concentrated a forage base of younger fish species, which attract larger sport fish. Locations chosen in 2018 were similar to locations in 2016 and 2017, and placing structures in “clumps” provide a larger single unit area for fish small to find protection. Hydroacoustic sonar techniques were successful in identifying game fish utilization of structures during the summer, however species and number of fish was not discernable.

Table 6. Mossback Habitat GPS Locations, 2016 -2018.

Label	Water Body	Easting	Northing	Zone
S-1	Lahontan	319286.07	4363829.56	11
S-13	Lahontan	319226.45	4363812.09	11
S-14	Lahontan	319222.71	4363803.18	11
S-15	Lahontan	320683.68	4366264.11	11
S-16	Lahontan	320684.12	4366260.66	11
S-18	Lahontan	319001.37	4363859.19	11
S-19	Lahontan	319015.51	4363910.63	11
S-2	Lahontan	319292.59	4363831.72	11
S-20	Lahontan	320205.28	4366352.37	11
S-21	Lahontan	320233.36	4366447.82	11
S-22	Lahontan	321636.25	4368146.84	11
S-23	Lahontan	321560.52	4368067.29	11
S-24	Lahontan	321498.88	4367957.85	11

Figure 4. Mossback Habitat Locations, 2016-2018.

Monitor Wiper Population Demographics

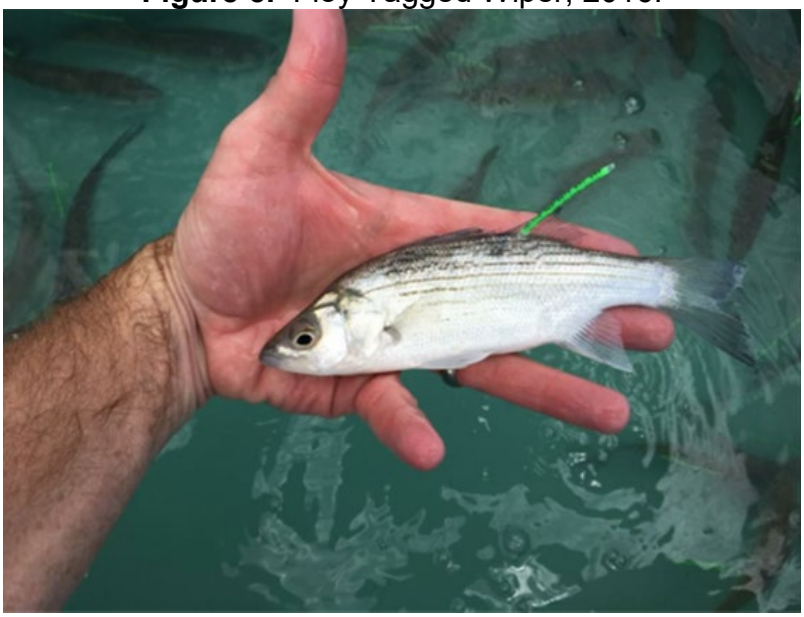
Tag 1,000 hatchery raised wipers with color specific Floy tags. Due to the size of wipers received and the apparent stress of transportation, no fish were tagged during 2018. Only 1,000 wipers were tagged in 2016 and another 1,000 in 2017 (see Figure 5) due to time constraints and concern over fish stress resulting from longer handling times required for tagging. During 2018, five wipers that were tagged on May 26, 2016 were caught. They averaged 18.2 in for a growth rate of 5.9 in per year (Table 7). In addition, six fish that were tagged on June 8, 2017 were caught, averaging 14.71 in. They showed a growth rate of 6.8 in during their first year in the reservoir.

Table 7. Tagged fish returned data, 2017-2018.

2017				
Tag #	tagged date	size tagged (ave)	return date	size at return
2958	5/26/2016	6.3	6/14/2017	13
2654	5/26/2016	6.3	6/14/2017	13.5
2100	5/26/2016	6.3	6/14/2017	13.5
2389	5/26/2016	6.3	6/30/2017	15
2985	5/26/2016	6.3	7/8/2017	14.5
2000	5/26/2016	6.3	7/15/2017	14.5
2000	5/26/2016	6.3	7/5/2017	14
2247	5/26/2016	6.3	6/5/2017	13.5
2000	5/26/2016	6.3	5/28/2017	14.5
2545	5/26/2016	6.3	6/28/2017	14
2000	5/26/2016	6.3	7/4/2017	15
2000	5/26/2016	6.3	7/5/2017	15
2489	5/26/2016	6.3	7/5/2017	15.5
			Ave	14.27
2018				
Tag #	tagged date	size tagged (ave)	return date	size at return
2000	5/26/2016	6.3	5/15/2018	18
2068	5/26/2016	6.3	4/8/2018	17.5
2000	5/26/2016	6.3	5/12/2018	18.5
2000	5/26/2016	6.3	7/4/2018	19
2000	5/26/2016	6.3	7/6/2018	18
			AVE	18.2
3245	6/8/2017	7.91	6/6/2018	15.2
3224	6/8/2017	7.91	5/17/2018	13.98
3689	6/8/2017	7.91	6/19/2018	14.5
3912	6/8/2017	7.91	7/23/2018	15.1
3000	6/8/2017	7.91	6/5/2018	14.5
3000	6/8/2017	7.91	8/15/2018	15
			AVE	14.71

Highlighted cell, tag number not recorded

Figure 5. Floy-Tagged Wiper, 2016.



MANAGEMENT REVIEW

All sport fish species appear to be showing improved population conditions and are recovering from the effects of the prolonged drought. Carp dominated in the angler creel (89% of total catch) during 2016; however, during 2017 and 2018, white bass dominated angler catches suggesting that reservoir conditions improved. Catch rates increased dramatically in 2018 and high reservoir storage levels should provide good angling opportunity next year as well.

Stocking walleye fry augments the natural population in Lahontan Reservoir and at times of extremely low water such as in 2008 through 2010 and 2012 through 2016, when natural reproduction was limited, augmentation may prove beneficial. Walleye survey catch rates were low during 2017, but it improved slightly in 2018 when available habitat was plentiful. Therefore, additional stocking of walleye fry should continue to rebuild their population structure and abundance.

Only juvenile walleye were caught during electroshocking along with having good habitat conditions during 2017 and 2018. During 2012, more than half (60%) of the walleye caught gill netting were under 10 in, which was a large increase from previous years. This suggests that natural reproduction was successful and/or there was an increase in survivorship of stocked fry. Conversely, no walleye less than 10 in were caught during extremely low water years between 2013 and 2016. An increase in juvenile walleye is promising and abundant recruitment into adults should occur in the next couple of years.

Several large wipers were observed during 2015 and 2016, none were observed in 2017, and several fish greater than fifteen pounds (approximately 30 in) and many around three pounds (approximately 18 in) were reported by anglers and found during

survey efforts in 2018. Wipers caught when gill netting in 2013 ranged from 7.5 to 10.1 in suggesting that stocking 8.0 in fish during 2012 was successful, though the growth rate was slow. Wipers averaging 6.0 in were stocked again in 2016, with 13-tagged wipers returned to creel in 2017. Growth was estimated at approximately 6.0 to 7.0 in from May 2016 to July 2017. During 2017 an additional 1,000 wiper were tagged and averaged slightly larger at 7.91 in. Early results of monitoring tagged fish indicate growth rates of 6.0 to 7.0 in per year during the first two years in the reservoir. Further monitoring will provide insight into long-term growth rates and on the effectiveness of a recent size/harvest-limit regulation change to no more than two fish at a minimum size of 15 in TL.

No large-scale fish mortality was reported during 2018. It was evident that fish populations benefitted from above average reservoir levels in 2011, however, surveys from 2012 to 2016 indicated that overall reproduction and survival of sport fish and forage fish were negatively affected by drought conditions. High reservoir storage levels since 2017 have provided abundant vegetative cover and should continue to provide beneficial reproductive habitat for most sport fish.

The Truckee Canal breeched in 2008 and, after temporary repairs, the Army Corps of Engineers allowed a maximum of 350 cfs to be diverted from the Truckee River to Lahontan Reservoir in 2009. Very limited flow occurred in 2010 and no flow was observed in 2011. Major reconstruction of portions of the canal was completed during 2012 and from 2013 to 2015 and 350 cfs at Derby Dam continued to flow and by the time water reached the reservoir the actual rate dropped to about 200 cfs due to evaporation and infiltration. The canal flowed for most of 2013 and in the early part of 2014, 2015, and 2016. When flows in the Truckee River cannot meet downstream demands in the Truckee Basin or flows from the Carson River are high enough to meet Carson Basin demands, the canal is turned off and flow is suspended to Lahontan Reservoir. The Truckee River Operating Agreement between the Bureau of Reclamation, Pyramid Lake Paiute Tribe, State of Nevada, State of California, and Truckee Carson Irrigation District was finally signed after nearly 27 years of conflict and negotiations. It is currently unknown what effect, if any, this will have on the long-term flows from the Truckee River to Lahontan Reservoir, however during 2018, flow was again observed in the canal.

The addition of protective cover for juvenile warmwater game fish occurred again in 2018. Monitoring fish population structure and distribution and conducting creel surveys will continue to examine how artificial habitats contribute to angler success and fish size structure, abundance, and distribution. Even though angling was less successful during 2014 and 2015, it was likely a result of persistent drought and subsequent low reservoir levels. During 2018, angling near artificial habitat structures was highly effective since fish use was documented through hydroacoustics.

RECOMMENDATIONS

General Management Objectives:

- Conduct a general fisheries assessment through opportunistic angler contacts and mail-in, angler questionnaire data.
- Conduct a general habitat assessment through visual observations of water quantity (lake level) and water quality (clarity) at least three times per year.
- Document dissolved oxygen and temperature when conducting veliger sampling.
- Monitor for the presence of quagga mussels by conducting tactile surveys around boat docks and reservoir substrates at least three times per year.
- Conduct quagga mussel veliger sampling through plankton tows at established transects at least once during spring.
- Stock one million walleye fry and 5,000 juvenile wipers.
- Monitor sport fish populations through gill netting four net-nights in late spring/early summer.
- Monitor sport fish populations through electroshocking four established transects in late spring/early summer.
- Concurrent to electroshocking surveys, collect white bass to augment the depauperate population in Washoe Lake.
- Coordinate with the commercial fishing operation to collect 20 Sacramento blackfish for examining mercury concentrations.
- Increase habitat complexity and increase juvenile habitat cover with artificial structures.

Study Specific Objectives:

- Continue to collect and evaluate wiper tag returns.

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